WHAT IS CLAIMED IS:

1. A semiconductor device comprising:

a lower electrode shaped as a convex formed on a semiconductor substrate, said lower electrode having crystals, a grain boundary between adjacent crystals being perpendicular to a side of the lower electrode;

a capacitor insulating film covering the lower electrode; and

an upper electrode formed on the capacitor insulating film.

2. A semiconductor device according to claim 1, wherein the crystals, with the grain boundary between adjacent crystals being perpendicular to a side of the lower electrode, constitute the side of the lower electrode.

3. A semiconductor device according to claim 1, wherein at least part of the grain boundary on the side of the lower electrode has a direction same as that of a grain boundary of the capacitor insulating film.

4. A semiconductor device according to claim 3, further comprising at least one cap film, made of an insulating material other than the capacitor insulating film, between at least an end portion of a top surface of the lower electrode and the capacitor insulating film.

5. A semiconductor device according to claim 3, wherein the side of the lower electrode is continuous

to a side of the cap film.

6. A semiconductor device according to claim 1, a lower end portion of the side of the lower electrode is covered by an insulating film.

7. A semiconductor device according to claim 1, wherein the capacitor insulating film formed on a top surface of the lower electrode has a thickness greater than that of the capacitor insulating film formed on the side of the lower electrode.

8. A semiconductor device according to claim 1, wherein the lower electrode is used as a memory cell of a stack-type DRAM.

9. A semiconductor device according to claim 1, wherein the capacitor insulating film is made of an oxide containing Sr and Ti.

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10. A semiconductor device comprising:

a semiconductor substrate;

a conductive plug formed on the semiconductor substrate;

a lower electrode formed in contact with the conductive plug and constituted by a plurality of crystal grains;

a capacitor insulating film formed on a side of the capacitor lower electrode; and

a upper electrode formed above the lower electrode via the capacitor dielectric film,

a grain boundary between adjacent two of said

plurality of crystal grains constituting the lower electrode being substantially perpendicular to an interface between the lower electrode and the capacitor insulating film.

11. A semiconductor device according to claim 10, wherein the lower electrode is formed as a convex.

12. A semiconductor device according to claim 10, wherein the lower electrode has a bottom and a cylindrical-type wall connected to each other, the cylindrical-type wall having an inner wall surface and an outer wall surface, and the capacitor insulating film is formed on the inner wall surface.

13. A semiconductor device according to claim 12, wherein the capacitor insulating film is formed also on the outer wall surface.

14. A semiconductor device according to claim 10, wherein a lower end portion of the lower electrode is covered by an insulating film different from the insulating film.

15. A semiconductor device according to claim 10, wherein the capacitor insulating film is also formed on a top surface of the lower electrode, the capacitor insulating film on the top surface of the capacitor lower electrode being thicker than that on the side of the lower electrode.

16. A semiconductor device according to claim 11, wherein:

a lower end portion of the lower electrode is covered by an insulating film different from the capacitor dielectric film;

the capacitor insulating film is also formed on a top surface of the lower electrode, the capacitor insulating film on the top surface of the lower electrode being thicker than that on the side of the lower electrode; and

a barrier metal layer is formed between the conductive plug and the lower electrode.

17. A semiconductor device according to claim 16, wherein the lower electrode is one selected from the group consisting of $SrRuO_3$, Ru, RuO_2, Re, Os, Pd, Rh, Au, Ir and IrO_2.

18. A semiconductor device according to claim 16, wherein the capacitor insulating film is one selected from the group consisting of $SrTiO_3$, (Ba, Sr)TiO_3, RO, Ta_2O_5, Pb(Zr, Ti)O_3.

19. A semiconductor device comprising:

a semiconductor substrate;

a conductive plug formed on the semiconductor substrate;

a lower electrode formed in contact with the conductive plug;

a capacitor insulating film formed on a side of the lower electrode; and

a upper electrode formed above the lower electrode

via the capacitor insulating film,

the capacitor insulating film being formed above a top surface of the lower electrode via a second insulating film different from the capacitor insulating film.

20. A semiconductor device according to claim 19, wherein:

the lower electrode is formed as a convex, a lower end portion of the lower electrode being covered by an insulating film different from the capacitor insulating film; and

a barrier metal is formed between the conductive plug and the capacitor lower electrode.

21. A method for manufacturing a semiconductor device comprising the steps of:

forming on a semiconductor substrate a mask layer having a hole through which a plug electrode is exposed;

burying a lower electrode in the hole of the mask layer;

forming a capacitor insulating film covering the lower electrode; and

forming an upper electrode on the capacitor insulating film.

22. A method for manufacturing a semiconductor device according to claim 10, further comprising a step of removing the mask layer, before the capacitor

insulating film is formed.

23. A method for manufacturing a semiconductor device according to claim 11, further comprising the steps of: removing a surface portion of the lower electrode to form a recess; and forming a cap film made of an insulating material in the recess, before the mask layer is removed.